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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,704	12/10/2001	Shane J. Trapp	M4065.0369/P369-A	3229
24998	7590	08/25/2004	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			UMEZ ERONINI, LYNETTE T	
2101 L STREET NW			ART UNIT	
WASHINGTON, DC 20037-1526			PAPER NUMBER	

1765

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/006,704	Applicant(s) TRAPP, SHANE J.	
	Examiner Lynette T. Umez-Eronini	Art Unit 1765	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 August 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-76 is/are pending in the application.
- 4a) Of the above claim(s) 1-25, 33, 36-70 and 73-76 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26-32, 34, 35, 71 and 72 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This communication is in response to applicant's Amendment filed August 9, 2004. Upon reconsideration of applicant's Amended claim 26, "A composition . . . , said composition consisting essentially of: . . . at least one fluorocarbon and ammonia, . . . is from about 2:4 3:1 to about 40:1" which was necessitated by the response of the Final Office Action of May 9, 2004, a new ground of rejection, which addresses the limitation, a composition comprising: a flowing plasma etchant mixture consisting essentially of at least one fluorocarbon and ammonia, wherein the flow rate ratio of each fluorocarbon to ammonia is from about 2:1 to about 40:1, in the previous Amendment of February 27, 2004 is presented and the finality of the last rejection is withdrawn.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

In claims 26, 71, and 72, "the flow ratio" lacks antecedent basis.

#### ***Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 26-30, 32, 34, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Hamrah et al. (EP 0 553961 A2).

Hamrah teaches a reactive ion etch process for etching oxide (insulative) layers by using a standard oxide etch chemistry that includes  $\text{CHF}_3$ , Ar, and  $\text{CF}_4$  (page 2, lines 1-5, 16-18), adding a gaseous source of hydrogen radical, such as ammonia to the oxide RIE etching chemistries (page 2, lines 32-34), and supplying a selected reactive gas mixture including a gaseous source of hydrogen radicals and RF are supplied to the chamber to establish an etching plasma (page 2, lines 44-46). The aforementioned reads on,

A composition suitable for use in etching an insulative layer formed over a substrate in a semiconductor device, said composition comprising:

a flowing plasma etchant mixture consisting essentially of at least one fluorocarbon and ammonia. Hamrah shows in Example 3, the flow rates of fluorocarbons and  $\text{NH}_3$  vary respectively, from 3 to 30 sccm and 4 to 10 sccm (see Table on page 6, lines 4-43). Hence the ratio of the said flow rates of fluorocarbon to ammonia falls within 2:1 to about 40:1, as **in claim 26**.

It is noted that no patentable is given to the limitation, "the flow rate ratio of each fluorocarbon to ammonia is from about 2:1 to about 40:1," which shows intended use, and does not materially affect the basic and novel characteristics of the composition and fails to show a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art.

The above aforementioned further reads on,

wherein said fluorocarbon is at least one member selected from the group consisting of fluorocarbons, **as in claim 27**;

wherein said fluorocarbon is at least one member selected from the group consisting of  $C_4F_8$ ,  $C_4F_6$ ,  $C_5F_8$ ,  $CF_4$ ,  $C_2F_6$ ,  $CHF_3$ , and  $CH_2F_2$ , **in claim 28**; and

wherein said fluorocarbon is at least one member selected from the group consisting of  $CF_4$ ,  $CHF_3$ , and  $CH_2F_2$ , **in claim 29**;

wherein said fluorocarbon is at least two members selected from the group consisting of and is a combination of  $CF_4$ ,  $CHF_3$  and  $CH_2F_2$ , **in claim 30**; and

Hamrah teaches the flow rate of 30 sccm  $CHF_3$  and 7 sccm ammonia (page 9, lines 2-5), which reads on, said flow rate ratio is within the range of about 3:1 to about 20:1 and 4:1 to about 10:1, respectively **in claims 34 and 35**.

Since Hamrah uses the same etchants to etch an insulation layer as that of the claimed invention then, using Hamrah's etchants in the same manner as in the claimed invention would result wherein said is ineffective to remove side wall spacers of a gate formed over said substrate, **in claim 32**.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamrah (EP '961 A2) as applied to claim 26 above, and further in view of Becker et al. (US 6,015,760).

Hamrah differs only in failing to teach wherein said fluorocarbon is a combination of  $\text{CF}_4$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$ , in claim 31.

Becker teaches anisotropic etching takes place primarily in the vertical direction so that feature widths substantially match the photoresist pattern widths (column 1, lines 40-43); and anisotropic etching is utilized when feature sizing after etching must be maintained within specific limits so as not to violate alignment tolerances or design rules (column 1, line 43-46); and selectively etching  $\text{SiO}_2$  layer with respect to a nitride layer by using a fluorinated chemical etchant system that comprises:  $\text{CF}_4$ ,  $\text{CHF}_3$  and a  $\text{CH}_2\text{F}_2$  additive material (column 4, lines 16-18) and in this way, the etching process provides for the formation of sidewalls in etched layers which have a substantially vertical profile (column 4, lines 29-31).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claim invention to modify Hamrah by combining the etchants as taught by Becker for the purpose of meeting specific limits that would not violate alignment tolerances or design rules (Becker, column 1, lines 43-46).

7. Claims 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamrah (EP '961 A2).

Hamrah teaches a reactive ion etch process for etching oxide (insulative) layers by using a standard oxide etch chemistry that include  $\text{CHF}_3$ , Ar, and  $\text{CF}_4$  (page 2, lines 1-5, 16-18), adding a gaseous source of hydrogen radical, such as ammonia to the oxide RIE etching chemistries (page 2, lines 32-34), and supplying a selected reactive gas mixture including a gaseous source of hydrogen radicals and RF are supplied to the chamber to establish an etching plasma (page 2, lines 44-46). The aforementioned reads on,

A composition suitable for use in etching an insulative layer formed over a substrate in a semiconductor device, said composition comprising:

a flowing plasma etchant mixture comprising  $\text{CF}_4$  and  $\text{NH}_3$ .

Hamrah differs in failing to specify the flow rate ratio of  $\text{CF}_4:\text{NH}_3$  is greater than 3:1.

It would have been obvious to one having ordinary skill in the art at the time of that claimed invention to employ any combination of flow-rate ratios of the etchants

gases as taught by the Hamrah reference, including those disclosed by applicants because the etchants are seen as equivalent for removing semiconductor materials.

8. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamrah ('EP 961 A2).

Hamrah teaches a reactive ion etch process for etching oxide (insulative) layers by using a standard oxide etch chemistry that include  $\text{CHF}_3$ , Ar, and  $\text{CF}_4$  (page 2, lines 1-5, 16-18), adding a gaseous source of hydrogen radical, such as ammonia to the oxide RIE etching chemistries (page 2, lines 32-34), and supplying a selected reactive gas mixture including a gaseous source of hydrogen radicals and RF are supplied to the chamber to establish an etching plasma (page 2, lines 44-46). The aforementioned reads on,

A composition suitable for use in etching an insulative layer formed over a substrate in a semiconductor device, said composition comprising:

a flowing plasma etchant mixture comprising  $\text{CHF}_3$  and ammonia.

Hamrah teaches a reactive ion etch process for etching oxide (insulative) layers by using a standard oxide etch chemistry that include  $\text{CHF}_3$ , Ar, and  $\text{CF}_4$  (page 2, lines 1-5, 16-18), adding a gaseous source of hydrogen radical, such as ammonia to the oxide RIE etching chemistries (page 2, lines 32-34), and supplying a selected reactive gas mixture including a gaseous source of hydrogen radicals and RF are supplied to the chamber to establish an etching plasma (page 2, lines 44-46). The aforementioned reads on,



A composition suitable for use in etching an insulative layer formed over a substrate in a semiconductor device, said composition comprising: a flowing plasma etchant mixture, comprising at least  $\text{CHF}_3$  and ammonia. Hamrah further shows the flow rates of  $\text{CHF}_3$  having a flow rate as low as 17 sccm and as high as 53 sccm (see Table on page 7, lines 12-56).

It would have been obvious to one having ordinary skill in the art at the time of that claimed invention to employ any combination of flow-rate ratios of the  $\text{CH}_3$  etchant gas as taught by the Hamrah reference, including those disclosed by applicants because the etchants are seen as equivalent for removing semiconductor materials.

### ***Response to Arguments***

9. Applicant's amendment (filed February 27, 2004) of base claims 26, 71 and 72, which recites the limitations, a flowing etchant mixture - consisting essentially of at least one fluorocarbon and ammonia, wherein the flow rate ratio of each fluorocarbon to ammonia is from about 2:1 to about 40:1; comprising at least  $\text{CF}_4$  and  $\text{NH}_3$ , wherein the flow rate ratio of said  $\text{CF}_4:\text{NH}_3$  is greater than 3:1; and comprising at least  $\text{CHF}_3$  and ammonia, wherein the flow rate ratio of said  $\text{CHF}_3$  is about 37 to 42 sccm, respectively and applicant's arguments that the said limitations are not taught by the Hamrah reference are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini at 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

ltue

August 23, 2004

**NADINE G. NORTON**  
**SUPERVISORY PATENT EXAMINER**

